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EXAMINER

SELLERS, DANIEL R

ART UNIT PAPER NUMBER

2644

DATE MAILED: 03/07/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

2

Office Action Summary

Application No.

10/628,235

Applicant(s)

KITAMURA, MAMORU

Examiner

Daniel R. Sellers

Art Unit

2644

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-9 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 July 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 7/29/03 12/06/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figure 1 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

2. Claim 3 is objected to because of the following informalities: "...power source supply control means for controlling supply of a power source for amplification **to the amplification means** according to a predetermined control signal;". Appropriate correction is required.

3. The phrase in bold should be removed from claim 3.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

5. Claim 1 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Chatterjee et al., U.S. Patent No. 5,898,340 (hereinafter Chatterjee).

6. Regarding claim 1, see Chatterjee

An audio reproducing apparatus for amplifying an audio signal according to a pulse width modulation signal generated based on a digital audio signal and further filtering the audio signal so as to output an analog audio signal, the apparatus comprising:

a first control loop for feeding back a source voltage supplied to amplification means for amplifying the audio signal to a supply control portion of a power source for amplification and compensating a pulse width of a control signal for controlling supply of the power source for amplification; (Col. 5, lines 30-39 and Fig. 1, units 105 and 209) and

a second control loop for feeding forward the pulse width modulation signal to the supply control portion of the power source for amplification to compensate the pulse width of the control signal. (Col. 5, lines 40-50 and Fig. 1, units 108 and 211-213).

Chatterjee teaches these two control loops.

7. Claims 2-4, and 7-9 is rejected under 35 U.S.C. 102(e) as being clearly anticipated by Carver, U.S. Patent No. 6,104,248.

8. Regarding claim 2, see Carver

An audio reproducing apparatus for amplifying an audio signal according to a pulse width modulation signal generated based on a digital audio signal and further filtering the audio signal so as to output an analog audio signal, the apparatus comprising:

Art Unit: 2644

a first control loop for feeding back a source voltage supplied to amplification means for amplifying the audio signal to a supply control portion of a power source for amplification; (Col. 6, lines 51-59 and Fig. 5, units 220-226A) and

a second control loop for generating a signal of approximately the same amplitude as the variation of the source voltage supplied to the amplification means and of an opposite phase based on the pulse width modulation signal and feeding the signal forward to the supply control portion of the power source for amplification, wherein the first and second control loops are used to control the supply of the power source for amplification. (Col. 1, lines 38-49, Col. 7, lines 33-45 and Fig. 5, units 230-236A)

Carver teaches an amplifier with these features.

9. Regarding claim 3, see Carver

An audio reproducing apparatus comprising:

modulation means for performing a conversion process based on modulation of an inputted digital audio signal and generating a pulse width modulation signal; (Fig. 5, 210A, 210B, 222, and 232)

amplification means for amplifying an audio signal based on the pulse width modulation signal generated by the modulation means; (Fig. 5, units 224 and 234)

filter means for filtering a signal outputted from the amplification means and generating an analog audio signal; (Col. Fig. 9A, unit 340, items R77 and C36)

power source supply control means for controlling supply of a power source for amplification to the amplification means according to a predetermined control signal; and (Fig. 5, units 210A, 212, and 220-226A)

compensation means for feedback-inputting the signal of the amplitude according to a source voltage supplied to the amplification means and for generating and feedforward-inputting the signal of approximately the same amplitude as the variation of the source voltage supplied to the amplification means and of the opposite phase based on the pulse width modulation signal generated by the modulation means so as to compensate the predetermined control signal. (Fig. 5, units 210B, 230-236A, R3, and R4).

Carver teaches an amplifier with these features.

10. Regarding claim 4, the further limitation of claim 3, see Carver

... wherein the power source supply control means is a switching regulator for exerting control to intermittently supply power from the power source for amplification to the amplification means according to the predetermined control signal; and (Col. 20, line 64 – Col. 21, line 6 and Fig. 5, units 226 and 236)

wherein the compensation means compensates the pulse width of the predetermined control signal based on the feedback-inputted and feedforward-inputted signals. (Fig. 5, units 210, 210A, 210B, 212, 220-226A, and 230-236A)

Carver teaches an amplifier with these features.

11. Regarding claim 7, see Carver

Art Unit: 2644

An audio reproducing apparatus for amplifying an audio signal according to a pulse width modulation signal generated based on a digital audio signal and further filtering it so as to output an analog audio signal, the apparatus comprising:

means for detecting a source voltage supplied to amplification means for amplifying the audio signal; and (Fig. 5, unit 220)

feedback means for feeding the source voltage back to a supply control portion of a power source for amplification so as to compensate a pulse width of a control signal for controlling supply of the power source for amplification based on the source voltage fed back. (Fig. 5, unit 220, items R1 and R2)

Carver teaches an amplifier with these features.

12. Regarding claim 8, see the preceding argument with respect to claim 2. Carver teaches an amplifier with these features.

13. Regarding claim 9, see the preceding argument with respect to claim 2. Carver teaches an amplifier with these features.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Carver and Kohdaka et al., U.S. Patent No. 5,245,345 (hereinafter Kohdaka).

16. Regarding claim 5, see Carver

An audio reproducing apparatus, comprising:

$\Delta\Sigma$ modulation means for performing a conversion process based on $\Delta\Sigma$ modulation to an inputted digital audio signal and generating a pulse width modulation signal;

amplification means for amplifying the audio signal based on the pulse width modulation signal generated by the $\Delta\Sigma$ modulation means;

filter means for filtering a signal outputted from the amplification means and generating an analog audio signal; (Fig. 9A, unit 340, items R77 and C36)

power source supply control means for controlling supply of a power source for amplification to the amplification means according to a predetermined control signal; (Fig. 5, units 212 and 226)

triangular wave generation means for generating a triangular wave signal based on a predetermined clock signal; (Col. 3, lines 11-19 and Fig. 5, unit 212)

signal generation means for generating a signal of approximately the same amplitude as the variation of a source voltage supplied to the amplification means and of the opposite phase based on the pulse width modulation signal generated by the $\Delta\Sigma$ modulation means; (Fig. 5, units 210, 210A, 210B, 220-226A, and 230-236A)

first comparison means for inputting to one input terminal the signal of the amplitude according to the source voltage supplied to the amplification means and inputting, to the other input terminal, the signal from the power source for amplification and the signal generated by the signal generation means so as to compare the two input signals and generate a difference signal; and (Fig. 5, unit 220, 230, Fig. 9A, unit 330 and Fig. 9B, unit 320)

second comparison means for inputting to one input terminal the triangular wave signal generated by the triangular wave generation means and inputting to the other input terminal the difference signal outputted from the first comparison means so as to compare the two input signals, generate the predetermined control signal and supply the predetermined control signal to the power source supply control means. (Fig. 5, units 222 and 232, Fig. 9A, unit 332, and Fig. 9B, unit 322)

Carver teaches an amplifier with the features as shown above. Carver does not teach a class D amplifier for use with the tracking power supply. However, it is inherent that the PWM used in the tracking power supply could have been used to create a class D amplifier, as shown in the prior art (Fig. 2). Carver also does not teach the delta-sigma modulation means or the conversion means. Kohdaka teaches a digital-to-analog converter (DAC), which employs delta-sigma modulation means and a conversion means (Col. 1, lines 52-65 and Col. 3, lines 49-51). Kohdaka's system does not teach an output stage for amplification, but it is inherent in the creation of a PWM signal that a class D amplification stage would be used for subsequent amplification. It would have been obvious for one of ordinary skill in the art to combine the teachings of Carver and Kohdaka for the purpose of higher fidelity in a class D amplifier with a digital input.

17. Regarding claim 6, see the preceding argument with respect to claim 5. The combination of Carver and Kohdaka teaches these features.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Robert W. Carver, U.S. Patent No. 4,218,660, Farrington et al., U.S. Patent No. 5,912,549, and Meir Shashoua, U.S. Patent No. 6,373,340.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Daniel R. Sellers whose telephone number is 703-605-4300. The examiner can normally be reached from Monday to Friday 9am to 6:30pm with every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sinh Tran can be reached on 703-305-4040. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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SUPERVISORY PATENT EXAMINER

DRS